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Global Positioning System Operations Status

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Who We Are

2d Space Operations Squadron Mission

To provide positioning, navigation, timing effects, nuclear detonation detection, and launch, anomaly resolution, disposal operations by operating and maintaining the Global Positioning System satellite constellation and dedicated ground network.

Motto

“On Time, On Target”





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Who We Are

- **2d Space Operations Squadron (Active Duty)**
 - 115 Personnel
 - Operators, Engineers, Analysts, Maintainers, Cyber Professionals
- **19th Space Operations Squadron (Reserves)**
 - Modernization continuity and subject matter expertise
 - Maintain certified operators in all crew positions
- **4 Crews conducting GPS operations**
 - 7 Military & 1 Civilian
 - Navigation Warfare Officer (NWO)
- **AF Technical Application Center (AFTAC), Det 46**
- **GPS User Operations Center**





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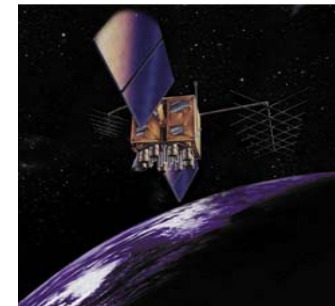
Constellation Snapshot

37 Total Satellites - 31 Operational
(Baseline Constellation: 24)

- **4 Generations of Satellites (Average age 13 years)**
 - **Block IIA - 0 Operational, 5 Spare**
 - 7.5 year design life
 - Launched 1990-1997 (Oldest satellite, SVN-23, disposed of on 26 Aug 2016)
 - **Block IIR - 12 Operational**
 - 7.5 year design life
 - Launched 1997-2004
 - **Block IIR-M - 7 Operational, 1 Spare**
 - 7.5 year design life
 - Launched 2005-2009
 - Added 2nd civil navigation signal (L2C)
 - **Block IIF - 12 Operational**
 - 12 year design life
 - Launched 2010-2016
 - Added 3rd civil navigation signal



Block IIA Satellite – Designed & Built by Rockwell International



Block IIR/IIR-M Satellite – Designed & Built by Lockheed Martin



Block IIF Satellite – Designed & Built by Boeing

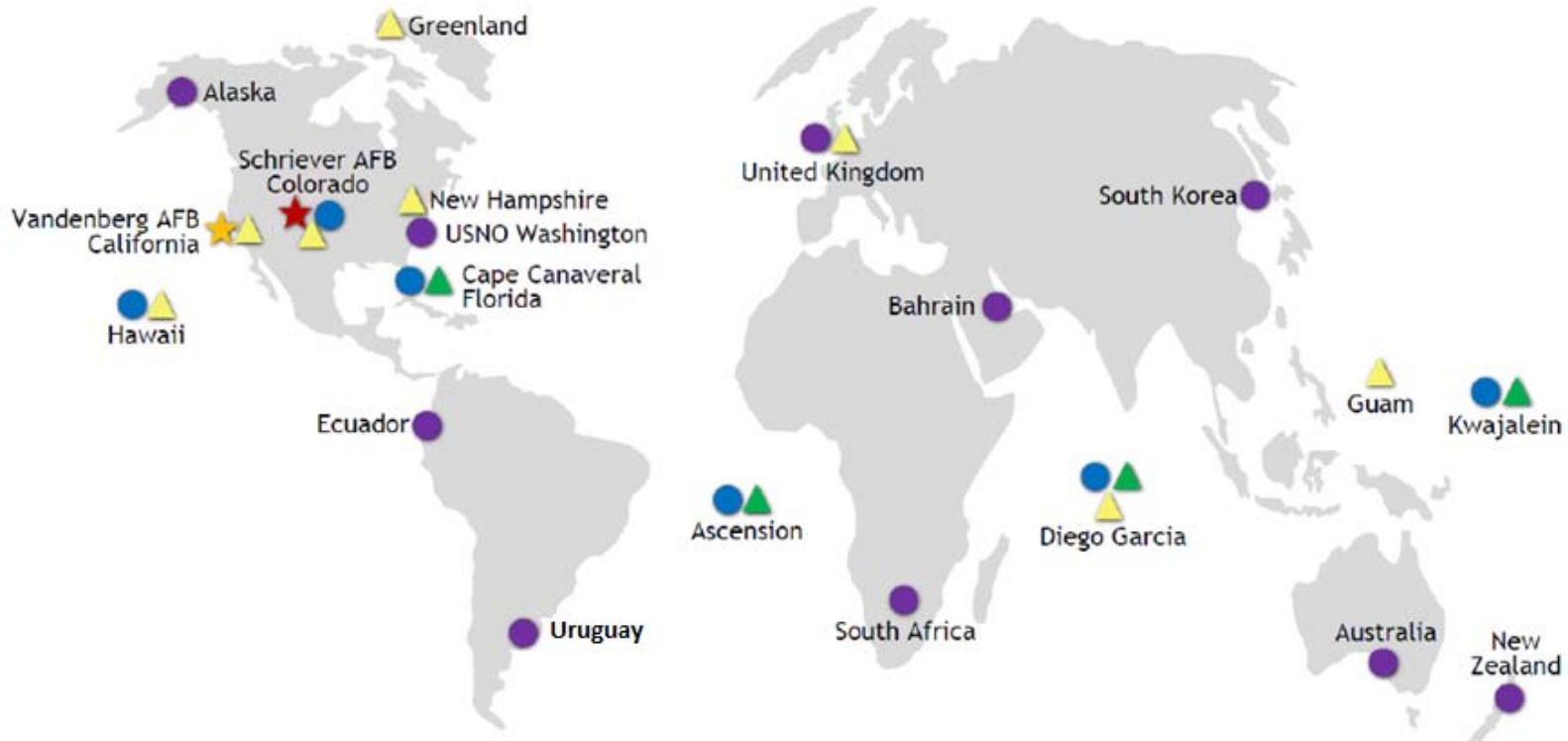
“Gold Standard” of Space-Based Navigation Systems Civil service performance commitment met continuously since 1993



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GPS Overview

Command and Control Segments



- ★ Master Control Station
- ▲ Ground Antenna
- Air Force Monitor Station
- ★ Alternate Master Control Station
- ▲ AFSCN Remote Tracking Station
- NGA Monitor Station



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Ground Segment

■ **Architecture Evolution Plan (AEP)**

- Day-to-day command and control of up to 32 satellites
- 4 dedicated Ground Antennas and AFSCN capability
- 6 dedicated and 10 NGA Monitor Stations



■ **Launch, Anomaly Resolution, and Disposal Operations (LADO)**

- Day-to-day command and control residual satellites using AFSCN
- State-of health monitoring
- Utilized for anomaly resolution during vehicle emergencies
- Satellite end of life disposal operations



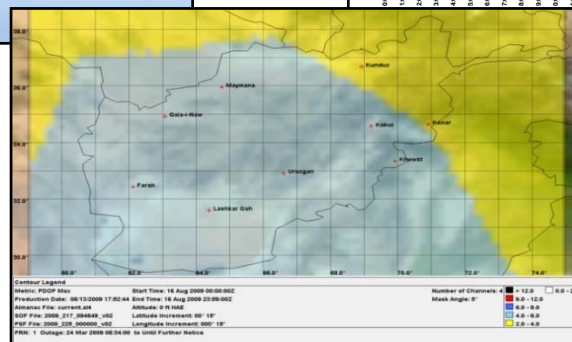
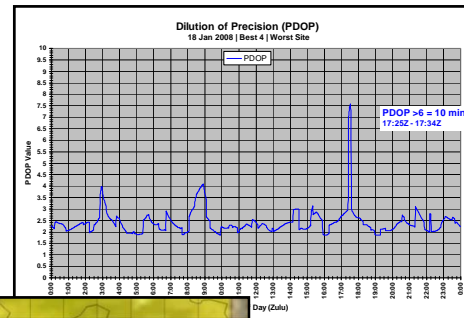


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User Segment: GPSOC

■ DoD's focal point for military GPS user issues

- Supports warfighter mission planning
- 911 for DoD GPS user emergencies
- Supports FAA/NAVCEN user issue resolution



Military applications

- Force location
- Navigation
- Force employment
- Weapon guidance
- Satellite positioning
- Comm network timing
- Plus Many Others

Civilian applications

- Aviation / Civil Navigation
- Space Shuttle
- Search and Rescue
- Geodetic Measurements
- Drilling / Mining / Agriculture
- Commercial
- Plus Many Others



Delivering the Best Space-Based PNT

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- ***Operating*** the gold standard in position, navigation & timing
- ***Sustaining*** capabilities for civil and military users worldwide
 - Maintain on-orbit satellites, ground systems
- ***Modernizing*** constellation with new signals and capabilities
 - New civil and military GPS signals and control capabilities
 - Launch new satellites
- ***Leading*** the way for **GPS systems & supporting stakeholders**



Committed to Responsible Stewardship of GPS





GPS-UTC Offset Anomaly

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- **GPS MCS incorrectly generated the GPS-UTC Bias Correction Parameter**
 - 15 SVs were uploaded with the incorrect parameter from ~2315z Jday 025 - ~0745z Jday 026
 - MCS software not designed to alarm operator to this specific parameter in the navigation broadcast
 - User reports led to an investigation into the broadcast
 - Database work-around completed in 2.5 hours
 - Operators uploaded nominal navigation datasets to all 15 SVs in 1.5 hours, completed at ~1315z Jday 026
 - **Software fix installed on MCS to eliminate the catalyst of the anomaly**
 - **Working with NAVCEN to more quickly communicate issues and fix time lines to users worldwide**
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Questions?

2d Space Operations Squadron
"On Time, On Target"